DIRECTING LEARNING ACTIVITIES FOR INSTRUCTION

Department of Education
Office of Vocational and Adult Education

FOR INSTRUCTION

Instructor Training Module #6

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1. How to Use This Booklet

2. Skill: Establish Positive Learning Atmosphere of Interest, Enthusiasm, Respect and Positive Interaction

3. Skill: Motivate Apprentices to Learn

4. Skill: Reinforce Apprentice Learning and Attitudes

5. Skill: Order Lessons and Activities So Each Builds on Previous Lessons

GLOSSARY

The words on this list are used in this booklet. Please review the terms and learn the definitions. The meaning the words as used in the text may not be the form of the word with which you are familiar.

Words/Terms

1. *Abstract* — To summarize.
2. *Ambiguous* — Unclear.
3. *Analogy* — Resemblance in certain aspects.
4. *Convergent* — To focus attention increasingly on a single idea or answer believed to be correct/useful.
5. *Criterion-based instruction and evaluation* — A system of teaching and evaluation in which the evalua questions are linked directly to the content. The degree of success apprentices earn during evaluatic determined by comparing apprentice responses to the test questions to some pre-determined standard of sue
6. *Differentiate* — To distinguish items from each other.
7. *Divergent* — To encourage attention to a variety of items or answers, any or all of which might be correct/us
8. *Hypothesis* — A tentative, possible answer. Usually several possible answers are considered before the answer is selected.
9. *Interrogative* — To question in a way that requires explanation and elaboration.
10. *Model of sequencing* — A single, systematic way of ordering information that is distinct from other models.
11. *Redundancy* — Repeating the same message.
12. *Reinforcement* — Information that strengthens a behavior.
13. *Sequencing* — Arranging in order a set of materials or information.
14. *Tedious* — Tiresome and difficult.

Related subjects instruction is an essential part of every apprenticeship program. It is the program component through which apprentices are taught the background theory and range of application of associated technical subjects such as mathematics, science and safety. Related instruction usually takes place in a classroom, after the regular work is over. Most frequently, related instruction is taught by a skilled tradesperson or craftworker. For the tradesperson or craftworker to be an effective trainer, he or she must not only know their trade skills, but also they must use teaching skills appropriate for conveying that information to apprentices. This series of materials is written to train related subjects instructors in the critical teaching skills necessary to perform their jobs effectively. The titles of the booklets in the series are:

1. *Introduction to Related Subjects Instruction and In-Service Training Materials*
2. *Planning the Apprenticeship Program*
3. *Planning Related Subjects Instruction*
4. *Developing Instructional Materials for Apprentices*
5. *Presenting Information to Apprentices*
6. *Directing Learning Activities for Instruction*
7. Providing for Individual Learner Needs
8. *Controlling Instructional Settings*
9. *Evaluating Apprentice Performance*
10. *Communicating with Apprentices*

The first booklet introduces the series, describes the content of each booklet, and provides an overview of apprenticeship and of adult learners. The second booklet describes how to plan an apprenticeship program and may be used by related instructors, sponsors or service agencies. Each of the other eight booklets deals with a set of training skills judged by a panel of experts on apprenticeship to be critical to working effectively as a related subjects instructor.

What Is This Booklet About?

The materials in this booklet are about arousing and

will be teaching. Directing learning activities involves creating a positive learning environment. This is a setting that can be characterized as one in which:

a. apprentices work in productive routines without distractions;
b. trainees and instructor share a thorough understanding of requirements and learning schedules
c. trainees and instructors enthusiastically undertake the learning activity; and
d. all activities ultimately focus on the work competency of the trainee.

Establishing and maintaining a positive learning environment means that in addition to your other teaching responsibilities you also must function as a classroom manager, setting the stage for learning, stimulating interest directing activity, and demonstrating applications of necessary knowledge. The skills that you will need in order to carry out this duty effectively are the contents of this booklet. These are:

1. Establish positive learning atmosphere of interest, enthusiasm, respect, and positive interaction;
2. Reinforce apprentice learning and attitudes;
3. Motivate apprentices to learn;
4. Order lessons and activities so each builds on previous lessons; and
5. Organize class for smooth transition across time, materials, content and activities.

What Must I Do To Complete My Work In This Booklet?

Working your way through this booklet will require you to read the text, to answer the questions, to perform the exercises, and to complete the pre- and post-assessment instruments. Expect to spend about five hours working through the materials. The only resources you need to complete your work in this booklet are: (1) a copy of the booklet; (2) a pencil or pen; (3) about two hours of time; and (4) recollection of past related instruction experiences.

The materials are written in a self-instructional, programmed format. You may work through the text, ex-

3. Step-by-step *directions* for how to perform the skill.
4. An *example* of how the skill is used in related instruction.
5. A *self-test exercise* to apply the information about the skill.

The self-assessment will assist you to focus on competency areas associated with directing learning activities for adult learners. Read each competency statement listed in Figure 1 and assess your level of skill in performing that task. Knowledge means what you know about the subject while skill means your experience in successfully performing the task. Circle the number that best describes your level of knowledge and skill. Competencies where your ratings are poor or fair are those on which you should concentrate. Pay particular attention to the chapters which deal with those competencies.

Figure 1:						
		Rating				
Chapters	Competencies	Poor	Fair	Good	Excellent	
2. Establish positive learning atmosphere of interest, enthusiasm, respect and positive interaction	1. Construct and use examples	1	2	3	4	
		1	2	3	4	
	2. Construct and use practice situations	1	2	3	4	
		1	2	3	4	
	3. Develop/use good questions	1	2	3	4	
		1	2	3	4	
	4. Encourage trainee enthusiasm	1	2	3	4	
		1	2	3	4	
	5. Deal with factors related indirectly to learning in the instructional setting	1	2	3	4	
		1	2	3	4	
3. Motivate apprentices to learn	6. Identify factors effective for motivating apprentices to learn	1	2	3	4	
		1	2	3	4	
	7. Apply appropriate motivational techniques to learning environment	1	2	3	4	
		1	2	3	4	
4. Reinforce apprentice learning and attitudes	8. Use principles of reinforcement in providing feedback and rewards to apprentices	1	2	3	4	
		1	2	3	4	
	9. Select and apply appropriate reinforcement strategies in the learning environment	1	2	3	4	
		1	2	3	4	
5. Order lessons and	10. Choose among alternative ways to order	1	2	3	4	

Introduction And Objectives

As the instructor in the related subjects program, it is your responsibility to create an atmosphere that contributes to effective learning. In such an environment apprentices display interest and enthusiasm. Interaction between instructor and trainee is positive. Each treats the other with mutual respect.

You can produce this type of environment through careful use of procedures including questions, examples and the general patterns of interaction. Each of these three instructional devices, questioning, examples, and general interaction, follows a slightly different set of guidelines. After you work your way through these materials, you will demonstrate your competence by being able to:

1. Suggest the ways to use both examples and practice in the instructional setting;
2. Develop and use questions in the instructional setting;
3. Critique questions to point out potential problems; and
4. Indicate ways to develop and maintain positive interaction.

What Is, Why And When To Use The Skill

A positive learning atmosphere is something that you should begin to work on before the first instructional period and continue to work on throughout the entire related subjects instructional period. It results from your management of instructional activities and can be engineered best through your behavior with regard to posing questions, providing examples and practice, and manipulating factors like interaction in the instructional setting. It sets the stage for effective learning; in its absence, learning is much more difficult and less efficient.

*Provide For Examples, Illustrations, And Practice**

One of the most critical things you must do as related subjects instructor is to provide illustrations examples and practice for apprentices. Such activity facilitates learning of skills and knowledge and aids the learner to apply the skills and knowledge to new situations in the work place. Examples and illustrations provide apprentices with a second way to view the information under consideration. This second view especially one that displays the information visually, is particularly critical because of the variety of ways that adults process information. Further, as you will recall from prior learning, adults usually understand combinations of visual and verbal information more easily than written or auditory types of information.

Practice offers apprentices an opportunity to learn thoroughly the knowledge and skills. It provides situations where information must be transferred to new settings and manipulated in order to solve problems and answer questions. New insights are gained while using the skills or knowledge. Equally important by using a skill or knowledge, apprentices gain confidence in their own abilities and skills. Once the skill or knowledge is used successfully, the apprentice develops an ownership of the materials and the particular process for using the information.

Examples and illustrations

Examples and illustrations are ways of relating the subject matter to the life/work experiences of apprentices. They are drawn from the workplace. Their worth is judged by the degree to which they render real, practical and useful the information under consideration. They aid understanding because they are concrete instances of the topic of concern.

Examples and illustrations take a variety of forms including visual, auditory, tactile, models, demonstra-

apprentices in your charge, select two or three examples for each major point.

2. As you select examples, order them according to level of difficulty. (See Chapter 5 in this booklet for a discussion about different ways of ordering materials.) The two most useful strategies for sequencing examples are concrete-to-abstract and simple-to-complex. By arranging examples according to the level of difficulty and concreteness you help apprentices to master more comprehensive and complex amounts of information about knowledge and skills under consideration.

3. Prepare the examples in advance of the lesson during which they will be used. If a handout, overhead, visual or model will be used as part of the example, be sure that it is ready. In addition, decide at what point in the lesson you will use each example *and* how you will introduce it.

4. Use the set of examples in the lesson. Be certain to introduce, display, discuss and relate each example you present to the lesson. If you use multiple examples, point out similarities and differences among them. Lastly, as you summarize the lesson, include a summary of the points emphasized through examples. Remember, the odds are good that the apprentices first will recall the examples you have presented; from the examples, they then will deduce and remember the major points of technical information under consideration.

Practice

Practice or application of the knowledges and skills being learned should become a standard portion of every lesson you teach. It can begin with something as simple as a review of the major points during which you ask questions to see if the apprentices have learned each major point. Such a review is most effective when you ask apprentices to demonstrate their understanding of the principles, concepts and skills by citing specific applications from their own trade or craft. When apprentices can offer appropriate examples you can be confident that they can identify and define at least the major points of the lesson. Adequate practice opportunities, however, go considerably beyond identifica-

solving the problem; (c) select a strategy to use and secure the information, equipment, parts, tools and so forth needed to use the selected strategy; and (d) solve and check the problem. You as the instructor have an opportunity to check apprentice understanding of the information under consideration in each of the four steps because by using problem-solving you observe trainee understanding of processes or procedures as well as the final outcome or product. Your steps and responsibilities in providing for problem-solving type practice are:

1. Formulate the problem, usually based on examples from the workplace often supplied by apprentices. Provide enough specific information so that the trainee can identify and diagnose the problem from given information. Be sure that the problem uses the major points under consideration and can be diagnosed without knowing other information; however, this does not mean that the identification or diagnosis is obvious. Make certain that trainees understand what is expected of them in terms of final resolution of the problem. Also, be sure that you have prepared all necessary information, handouts, displays, data and so forth that are needed to diagnose and solve the problem.

2. Present and explain the problem. Emphasize what the expected performance will be as well as the time frame in which apprentice activity is to occur. Further, if there are any special conditions, note them before activity begins. It also is useful to discuss the timing and requirements of evaluation before activity begins.

3. Check the procedures and products that are used by apprentices in the problem-solving exercise. Note incorrect or inaccurate use of skills and knowledges for later discussion. Note and reinforce use of appropriate procedures and equipment.

4. At the conclusion of the exercise discuss the problem, apprentice findings, solutions and procedures, together with the most appropriate ones with trainees. Note difficulties that you observed during the exercise, as well as strengths you noticed. If

d.   evaluate progress and learning;

e.   stimulate and direct learners to seek out addi-
     tional information;

f.   shape learner performance and behavior;

g.   give directions and ensure that instructions are
     understood;

h.   review and summarize information;

i.   diagnose individual learner needs;

j.   correct misbehavior and disruption;

k.   build self-concept and confidence; and

l.   focus emphasis and attention of the learner.

The primary reason for asking questions is to cause
learners to think. There is a direct relationship between
the type of question asked by you as an instructor and
the type of learning and thinking that a trainee uses in
considering and answering the question. For example,
if you pose questions that ask only for facts, then
learners will respond only with facts and will use only
facts in thinking about the question. However, if you
ask questions that require the learner to apply, transfer
and process information, the apprentice will transfer
facts and concepts to new situations as he or she works
to answer the questions.

Good questions require the trainee to process and
apply a variety of information in order to respond.
These questions are judged by their clarity and their
ability to stimulate different kinds of thought. They
facilitate achievement of the instructional performance
objectives — knowledge, skill and attitude objectives.
Clear questions leave no doubt about the purpose of the
question. Further, because they must be written in
understandable language, questions reference familiar
knowledge and skills and require the respondent to
apply the information in some new way or to a different
situation.

Questions are of different types and may be classified
according to the type of information processing re-

a memory question is "What tool is this?" Unfor-
tunately this type of question makes up the majority of
questions asked by teachers. Too often this type of
question does not require the learner to apply the
knowledge or skills that have been learned. Figure 2
illustrates several common types of questions. A good
lesson will include questions from each listed category.

The most critical part of questioning is formulating
and phrasing the question. You can simplify your ques-
tioning responsibilities if you follow the logical steps
presented in the following discussion.

Step 1: Consider Possible Areas of Questions

First, make preliminary decisions about what you
want to do in asking questions. Consider: (a) What
purposes do you want to achieve with the use of ques-
tions?; (b) What are the performance objectives and
content you want to address during instruction with
questions?; (c) What types of questions do you want to
use, given the content? As you consider each item, you
will determine the underlying focus and strategies of
your teaching. Remember, a good question stimulates
thought, serves as a model, and leads to excellent
learning.

Some instructors find that constructing and using a
chart like that displayed in Figure 3 assists them in em-
ploying questions in class. In most instances, you will
find that after about three times of spending the thirty
extra minutes of preparation time per class session to
construct the chart, you can reduce dramatically the
time required in preparation. Eventually you will need
to make only a couple of notes about questions you will
ask rather than writing out the entire chart.

You will be able to fill in other parts of the chart as
you work your way through Steps 2 and 3 of these
materials.

Figure 2: Types of Questions

1.

2.

3.

4.

Step 2: Phrase Sample Questions

Once you have decided on the purposes and kinds of questions you would like to ask, spend time writing out sample questions. Work on the phrasing you will use in class. When properly written, a good question will be clear. It will:

1. use vocabulary appropriate to the respondent group;
2. indicate what type of thinking or behavior will be required by respondents;
3. contain content about the purpose of the question; and
4. be correct grammatically.

A good question will leave no doubt about what is being asked, even by those who neither know the answer nor know exactly how to find the answer. You should actually write out several sample questions related to each content or performance objective. Doing this will help you to formulate and use questions during the lesson. Not only will you have a set of prepared questions to use, you also will have a pattern of question type and format that will aid you to generate good questions while presenting the lesson.

After writing out your sample questions, check each question against the list of guidelines for phrasing listed below. Correct any limitations or problems that you see

understand too much about the materials under consideration; questions that may be clear to the instructor or may follow from the context often will not be understood by an apprentice. Also be certain to ask only one thing at a time in questions to avoid confusion. Examples of ambiguous questions overheard in related subjects instruction include: (a) What about labor unions?; (b) What has the most force?; (c) What do you know about pipe?; and (d) Is that too far off? None of these questions is clear. Using any of these in a related subjects setting would be more detrimental than useful.

2. Construct *interrogative questions* rather than yes/no type questions. Yes/no questions usually require little thought. In fact, they encourage guessing since the respondent always has a 50 percent chance of being correct. Instead, phrase questions so that they ask why, who, what, when and how. Further, use active verbs or words that express what must be done as you construct questions. An example of a question, first phrased as a yes/no type question and then as an interrogative question is:

Poor: Is there more than one force acting in the hydraulic system?

Better: What are the forces at work in this hydraulic system?

3. Phrase questions directly, in the language of the learner. Avoid giving cues or clues. If the answer to a question is obvious, then the question is not worth asking. The goal in questioning is to stimulate

tions in the instructional setting. Use the following guidelines to develop a strategy for questioning.

1. Ask fewer questions than is usually the case in most classes. Focus the questions on the more important information and applications under consideration. Use questions that are broad and lead to constructive thought. Instructors often ask too many simple questions under the mistaken impression that they are stimulating thought and discussion. In fact, if the questions do not motivate learners, the instructor actually may be discouraging learner interest. Three questions per major point is usually quite sufficient.

2. Distribute questions equitably throughout the classroom. Ask questions both of respondents who are usually willing to answer and those who often may not be too willing to answer. Eventually, you will bring most learners into the discussion.

3. Use the learner's response constructively. Certainly you must point out and correct misinformation. However, results from many studies of effective teaching suggest that there are several things you can do with answers to encourage learning. First, be prompt in your response after the learner has answered. Second, try to phrase questions so as to encourage the amount of time of learner talk compared to yours. Often it helps trainees to process and learn the information if they hear their peers and themselves talking about it. Third, even if an answer is mostly incorrect, reinforce any portion of the answer that is right while working to get the complete right answer. Fourth, redirect questions and use prompts to extend the question, or questions that might arise from proposed answers, to other trainees. If you can demonstrate the relationship of the information from the first question to a variety of other questions, it greatly improves trainee learning.

Step 4: Summaries

At the conclusion of a question and answer session, summarize what transpired in terms of major points of content discussed. This reinforces the major points under consideration.

Arrange furniture

Arrange furniture, materials and equipment in ways that help to focus attention on the knowledge, skills and tasks to be mastered. Often a traditional classroom set-up simply will not function effectively for related subjects instruction. Do not hesitate to set-up the physical space in any way that helps you to demonstrate or practice or observe a skill...or to stimulate a discussion. Remember, the greatest instructor-learner interaction occurs between the instructor and those in the front and center seats. Therefore, intentionally seek out willing and unwilling respondents from throughout the instructional setting.

Amount of instructor talk

Seek to reduce the amount of time you talk as an instructor relative to the amount of time trainees talk about the content under consideration. Too frequently instructors talk over 85 percent of the time in the instructional setting, even though studies have demonstrated that learner achievement is greatly boosted by increased amounts of trainee talk relative to processing and applying the information or skills.

Use variety of materials

Consider increasing learner autonomy by making available a substantial amount of instructional materials. The variety will help to meet differing learner needs. Further, by permitting and encouraging apprentices to use the materials on their own you help the apprentice to accept the responsibility for their own training and learning outcomes. In fact, results from a number of studies have demonstrated that for adult learners, after the initial presentation, the best instructional materials are those that can be used by individual (or groups of) learners with minimal instructor assistance. However, supervision is required and assistance should be available, if needed.

Be expressive in interaction with learners

Setting: A car is brought in for service because the owner has found that it is stalling in traffic as she tries to accel
You start the car and it sounds like this (play tape). You check the timing, points, and plugs and there is no app
problem. In order, what things do you check next and how do you know if they are o.k.?

Problems	Procedures
1.	1.
2.	2.
3.	3.

Additional Information

For additional information on creating and maintaining a positive learning atmosphere, you might wish to read:

N.M. Sanders. *Classroom Questions.* (New York: Harper and Row, 1966).

G.G. Weaver and L. Cenci. *Applied Teaching Techniques.* (New York: Pitorse Publishing Corp., 1960).

Self-Test Exercises

Answer the following questions in the space provided or on separate paper. Check your answers with those provided in the appendix at the back of the booklet.

1. In what ways do the development and use of examples and practice situations differ in the related subjects instructional setting?

2. Suggest strategies for improving instruction in th related subjects instructional setting.

3. Read each of the following questions and critiq it in terms of strengths and limitations.

   a) Is a fouled fuel line the correct diagnosis of t problem? _____

   b) Are there mitigating circumstances that ove ride the diagnosis? _____

   c) Why are you using that tool? _____

   d) What is the proper procedure? _____

   e) Can you lift a person in that manner? _____

4. Construct a set of questions to use in your relate subjects instructional responsibilities.

3. Skill: Motivate Apprentices To Learn

Introduction And Objectives

Motivation is a key element in learning. It is the force that arouses, directs and sustains the apprentice in a learning situation. Without sufficient levels of this force, apprentices may not be motivated to complete or succeed in related subjects instruction.

There are a number of factors which influence the motivational levels of individual learners. For example, material that is relevant to the personal interests of an apprentice motivates him or her to become more involved in and potentially learn more from the related subjects instruction. Instruction which stimulates trainees' curiosity further motivates them to learn. It is thus the responsibility of the related subjects instructor to incorporate these factors into instruction in order to generate interest, enthusiasm, initiative and, as a result, apprentices who are motivated to learn. This chapter describes the factors that affect motivation and provides some specific motivational techniques for use in apprenticeship related subjects instruction. After completing this chapter you should be able to:

1. Describe the primary motivations for learning;
2. Determine what motivates your apprentices to learn;
3. Describe alternative techniques for increasing motivational levels of apprentices in related subjects instruction; and
4. Apply appropriate motivational techniques in your related subjects setting.

The Nature Of Learning Motivation

Avoidance—the motivation to avoid unpleasa situations or stimuli.

Each of these factors motivates individual apprentice to differing degrees, depending on the instructional su roundings, the social environment, characteristics the related subjects instructor and personal traits of th apprentice. Thus, you can change the motivation levels of your trainees by altering various aspects of th instructional situation. In the next section, specific tec niques and guidelines are presented for arousin directing and sustaining motivation of apprentices your charge.

Ways To Motivate Apprentices

There are a number of ways that you, as a related su jects Instructor, can motivate trainees. Remember, d ferent techniques will be effective for different appre tices. Much of motivating apprentices is a trial-and-err process of determining and applying what works be for whom. The two-step process that follows provid guidance in using various motivational strategies.

Step 1: Identify Effective Motivators

First, take into account what you know about ind vidual apprentices in order to determine what needs forces motivate them to learn. This could involve viewing formal assessment data that you collec observing apprentices in various work and learnin

Curiosity

Curiosity is a natural motivator to learning. It arouses apprentices to pursue and explore subjects on their own initiative. It is an inherent characteristic of everyone that you can use to good advantage with proper stimulation. Some ways to promote curiosity in apprentices include the following:

1. Ask thought-provoking questions. For example, introduce a principle or rule and ask your apprentices why they think it is so. What examples of the principle at work can they come up with? Can they think of any exceptions?
2. Encourage your apprentices to ask questions themselves.
3. Help apprentices find their own answers to questions by providing clues or sources to which they can refer.
4. Promote critical thinking and dissent. Introduce ideas that are debatable.
5. Introduce conflicting or seemingly conflicting materials, principles or ideas. Encourage apprentices to explore and discuss them further.
6. Assign problems for small groups to solve.
7. Bring or encourage apprentices to bring novel materials or objects into the related subjects group.
8. Allow and provide for an in-depth study of subject matter.
9. Reinforce curious behavior.

Interests

Apprentices are more motivated to learn when the subject matter is something of personal interest. Thus, make clear the relationship of the topics and material with the apprentices' interests and areas of specialization. This is not always possible since requirements of related instruction may not match interests of the apprentices. Some guidelines for making instruction more interesting and as a result more motivating follow.

1. Within limits imposed by course requirements give apprentices the responsibility to develop and pursue their own objectives, selecting preferred learning methods and materials.
2. Provide learning activities that emphasize application and active participation and result in tangible outputs.
3. Permit and encourage apprentices to present or discuss learning experiences. Talking about their activities increases enthusiasm and interest.
4. Pair interesting activities with those that are not so interesting.
5. Reinforce the completion of a non-interesting activity with one that is interesting.
6. Show interest yourself in activities or topics that are not of particular interest to the apprentices. Your role modelling may create new interests for your apprentices.

Avoidance

A final motivator, or rather a "dis-motivator," is the tendency to avoid those things that cause unpleasant emotions or sensations, such as fear, anxiety, frustration, embarassment, boredom and physical discomfort. To the extent possible, remove these dis-motivators from related subjects instruction. A summary of some conditions and behaviors you should look out for and try to eliminate or avoid is presented in Figure 5.

standards of success.

Threatening failure.

Being unpredictable about standards of success.

Practices That Cause Frustration:

Learning activities that are inconsistent with apprentice abilities.

Not making known the meaning of the instruction.

Avoiding apprentice questions.

Interrupting an activity in which an apprentice is involved.

Providing no or incorrect feedback on an apprentice's performance.

Testing skills not in the objective of the learning activities.

Practices That Humiliate or Embarrass Apprentices:

Comparing an apprentice unfavorably with others or pointing out his or her mistake with other

Laughing at or belittling apprentices' efforts.

Repeatedly failing an apprentice.

Disciplining an apprentice in public.

Conditions Which Lead to Boredom:

Presenting information impersonally, passively or in a monotone.

Providing no challenge.

Presenting information the apprentice already knows.

Not varying modes of presentation.

Situations Which Cause Physical Discomfort:

Noise and other distractions.

Long periods of standing or sitting passively.

Extreme temperatures.

Working with equipment or tools that are not designed or adjusted properly.

Reading print (on blackboards, books, visuals) that is too small or blurred.

Example

As part of an attempt to expand the scope of related mathematics instruction provided to apprentices at a large tool and die manufacturer, Leo Trask was reviewing his overall instructional plan. In thinking back over recent experiences, Trask realized that his instruction was getting a little stale. Apprentices did not seem to ask as many questions as they used to; no one was pursuing topics of special interest or sharing relevant experiences that occurred on the job. The more he thought about it, Trask himself was not as interested in the material as he used to be. So, Trask decided that, as part of changing the scope of the related mathematics, he was going to make an active attempt to stimulate motivation. His first step was to review the instructional materials he was using. He decided to replace 75 percent of them, ordering materials with broader scope, more up-to-date and realistic applications, and a varied set of problems and projects. This alone, Trask felt, would re-stimulate his own interest and provide for instruction that was more relevant to the current needs of his apprentices. He also listed some things he would try to incorporate in instructional activities:

1. Assign more projects and application problems to the apprentices.

2. Permit apprentices to select from and sign up for projects of their choice.

3. Schedule a discussion period where projects are presented and commented on.

4. Before each session, prepare a set of questions to stimulate thought, discussion and further questions.

5. Periodically evaluate success of these activities in increasing self and apprentice motivation.

Trask found that apprentices responded favorably to several of the techniques. The biggest difference seemed to come from his own renewed enthusiasm. In addition, he found the proportion and use of good questions and the closer alignment of related subject content and current activities on job to be especially effective.

Additional Information

S. Ball. *Motivation In Education*. (Princeton, N.J.: Educational Testing Service; 1977).

I.L. Russell. *Motivation*. Dubuque, Iowa: William C. Brown Col, Publishers; 1971).

J.F. Travers. *Learning: Analysis and Application*. (New York: David McKay Company, Inc.; 1970).

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b. _____

c. _____

d. _____

e. _____

2. Describe a means for improving apprentice motivation for each of the five categories listed above.

a. _____

b. _____

c. _____

d. _____

e. _____

3. For each of the five motivators you listed in Exercise 1, rate the extent to which your apprentices on the whole possess the motivation. Then consider each of the questions included below.

Fill in the five motivators here:	Are highly motivated by this	Are motivated by this	Are only slightly motivated by this
a.			
b.			
c.			
d.			
e.			

Are there areas where the group as a whole is low in motivation? How does this affect learning and success in related subjects instruction? What techniques could

particularly unmotivated to learn? Which of the five *primary motivators* appear to be the problem areas? What strategies could you use to improve the motiva-

utility of reinforcement for shaping apprentice behavior and be able to incorporate various reinforcers into the instructional process. This chapter contains information and guidelines that will assist you in this aspect of instruction. After working through the chapter, you should be able to:

Distinguish between the reward and informational aspects of reinforcement;

2. Describe the principles of reinforcement as they relate to learning;

3. Apply these principles in the related subjects instructional setting.

Characteristics of Reinforcement

Reinforcement is a necessary condition for learning. Without reinforcement, a learner is not informed of the correctness of his or her responses. As a result the learner is unsure about how to proceed in a learning task. Also, in the absence of some type of reinforcement, a learner gains little personal satisfaction from learning and thus has no motivation to proceed.

The two beneficial aspects of reinforcement are satisfaction and information. It is a reward in that it provides personal satisfaction. It is an information source in that it provides feedback on progress.

To clarify the distinction between the two aspects of reinforcement, consider an apprentice auto mechanic who is learning to tune a car. As part of a hands-on learning experience she is practicing adjusting the fuel mixture in the carburetor. The instructor who checks the apprentice's work provides one type of informational reinforcement — whether she did it correctly and if not where was the error. A second type of informational feedback is inherent in the task. In this example, if the apprentice adjusts the engine poorly, it will miss, smoke or stall. As the apprentice approaches the correct setting, the engine will begin to sound smoother and smoother. This aspect of the task also has the potential of providing reward to the learner. Completion of a task or set of tasks can be very staisfying personally. Finally,

- Reinforcement provides for personal satisfaction from learning to the point where learning itself may become a reinforcer.
- Reinforcement can serve as a motivator for learning (Motivational strategies are discussed in the previous chapter of this booklet).
- Reinforcement can help to establish a good relationship between the apprentice and instructor.

How to Apply Reinforcement Strategies

Reinforcing apprentice behaviors and attitudes involves four steps:

1. Plan reinforcement — Decide what, when and how you are going to reinforce apprentices.
2. Individualize reinforcement — Apprentices differ in what is rewarding as well as their sensitivity to reinforcers such as praise. Thus, individualize your plan to the extent you are able.
3. Let apprentices know what the rewards and criteria for appropriate behavior will be.
4. Actively reinforce behavior and attitudes.

Plan and apply various reinforcement strategies using the following guidelines. They are general principles of reinforcement and describe some effective instructional reinforcers.

Principles of Reinforcement

Take the following principles into account when you reinforce apprentices:

1. Use reinforcement immediately following the behavior to be reinforced. The closer the two are in time, the more effective the reinforcement. For example, test grades provide more information and reward when test papers are returned promptly.
2. Link the reinforcer to the behavior that is being reinforced. If activities occur between the behavior and reinforcer, apprentices will be unsure about which behavior to maintain. For example, if an apprentice did an excellent job on a particular learning activity and subsequently performed an activity in an unsafe man-

4. Positive reinforcement is very effective. Design learning activities so that an apprentice will be able to succeed at least some of the time. This way you provide positive reinforcement, rather than informing the apprentice that he or she is consistently incorrect. When negative reinforcement is required, encourage the apprentice.

5. The stronger the reinforcer the more effective it is in shaping behavior. This will vary substantially between different apprentices. To some apprentices, praise and peer approval are the strongest reinforcers. Others may be reinforced strongly by task completion. The process of discovering what works best for whom will be a trial and error process until you get to know the apprentices better.

Effective Reinforcers

There are a number of reinforcers which have been used to varying degrees of success as rewards or feedback in instructional settings. The following paragraphs describe the various reinforcers, pointing out their relative effectiveness and strengths and limitations. Take this into account when planning to reinforce learning, but keep in mind that effectiveness will depend on individual learner characteristics.

Instructor Praise

Praise from the instructor may be very effective when it follows an appropriate behavior by the apprentice. When paired with information, praise can be used to refine behavior. For example, provide praise and encouragement to an apprentice who makes progress on a learning activity in addition to feedback which tells the apprentice how to proceed or how she/he might further improve performance.

There are, however, two potential difficulties in using praise as a reinforcer. First, it must be associated with some type of evaluation. That is, either through testing or observing the apprentices at work, you must collect information as to how the apprentice is progressing in order to provide feedback. Since testing is generally an infrequent occurrence, this does not allow you to pro-
vide feedback on a day-to-day basis. Also, while much

Grades

For grades to be successful reinforcers, they should exhibit three characteristics. First, the grades or scores must be linked to the behavior which is being evaluated. If an apprentice receives a grade of C on a test, but is not informed which behaviors (or attitudes) were desirable and which were inappropriate, the reinforcement value of the grade is reduced. Second, there should be a rationale for the grading system. Comparing apprentice behavior with other apprentices may be reinforcing for those near the top, but on the whole this is a poor rationale for grading. A criterion-based system, where an apprentice's performance is compared with a pre-defined standard of success, offers a rationale which is easy for apprentices to accept. Finally, the system should provide consistency in assigning grades. If the apprentice does not believe that his or her behavior causes the grade, the behavior will not be reinforced. Again, a criterion-based system, with its objective standards, enables the instructor to be consistent.

Evaluation is a necessary part of related subjects instruction. Thus, an entire module in this series is devoted to the topic.* In applying the procedures suggested in that module, keep in mind the reinforcement potential that grades can have for some or all of your apprentices.

Competition

Related to the notion of grades is the reinforcing value inherent in winning a competitive event. Remember, competition is an effective motivator for those who do very well. If you can design competitive events where everyone wins occasionally, they can be useful. Inevitably, though, there are the few trainees who are always losers. An alternative approach is to design group competition activities. This evens out the odds of success, while encouraging cooperative behavior and building norms for success within groups.

Peer Approval

Peer approval is an extremely strong reinforcer or

the gratifying effects associated with completing a task. Some apprentices are naturally rewarded by task completion. For others you may have to nurture this feeling. This can be accomplished by providing other types of reinforcement along with task completion. If the successful completion of an activity is paired a sufficient number of times with other rewards, the completion in itself will begin to be rewarding. Consider for example an apprentice who consistently does not do his assignments. His instructor plans to use reinforcers that will encourage the apprentice to complete his assignments. The instructor's first move is to try a negative reinforcer to get the apprentice to complete his assignment the first time — if the behavior does not occur at all you cannot reward it. So the instructor talked with the trainee's job supervisor who then threatened a less desirable work assignment if the trainee did not complete his related subjects work. After the trainee completed the assignment, the instructor resorted to positive reinforcement by appointing the apprentice as leader of a group instructional activity. The next week the instructor enlisted the assistance of the job supervisor, whom the apprentice respected, to provide praise for completing related subjects assignments. By this time, the apprentice was beginning to respect the instructor and to accept her praise as reinforcement. Eventually, success in related subjects instruction became rewarding in itself.

Task Feedback

Oftentimes feedback must be incorporated into the task to indicate when an activity is completed successfully. In criterion-based training, standards for success are made clear to apprentices before an activity is begun. Feedback can be provided by you the instructor in observing apprentice behavior. Also feedback can be provided by the task. For example, you can provide apprentices answers to learning exercises so that they can check their own progress. Remember that, if the task itself does not provide feedback — such as the example of adjusting the carburetor — you must provide

to their correctness is not provided.

Non-reinforcement also can be used the related subjects instructor. In this behavior is not reinforced (ignored). structor wants the behavior to fade. Such be useful for disciplinary problems, who more fully in module #8. But remember couple non-reinforcement with rewards mation regarding the appropriate behavior

Example

Allen Newton teaches a course entitled Organizations, at a community college. It deals with all aspects of work, including taking criticism and directions, appropriate grooming, labor unions, supervising employees on. Newton frequently has apprentices from of different local firms in his class, thus to individualize course content and activities to the sible. As part of the individualized planning plans how to reinforce learning. He utilizes self-teaching materials and incorporates feedback learning exercises so that the apprentices mine whether they have completed assignments cessfully, 2) realize where they made errors directed as to how they can improve their skills. He also makes an effort to find out which of the tices require more of his help and praise completing a task. Next, he makes clear how learning will be evaluated and what rewards gain through the completion of the instructional activities. He is careful to point out the value mastering instructional content to their success working world. As appropriate, he also mentions intermediate rewards that they may expect experience in the classroom:

1. Working together on group activities
2. Perfecting job interviewing techniques
3. Completing 45 hours of related subject struction.

Finally, Mr. Newton applies his planned reinforcement

A most useful and effective reinforcer proves to be the gratifying effects associated with completing a task. Some apprentices are naturally rewarded by task completion. For others you may have to nurture this feeling. This can be accomplished by providing other types of reinforcement along with task completion. If the successful completion of an activity is paired a sufficient number of times with other rewards, the completion in itself will begin to be rewarding. Consider for example an apprentice who consistently does not do his assignments. His instructor plans to use reinforcers that will encourage the apprentice to complete his assignments. The instructor's first move is to try a negative reinforcer to get the apprentice to complete his assignment the first time — if the behavior does not occur at all you cannot reward it. So the instructor talked with the trainee's job supervisor who then threatened a less desirable work assignment if the trainee did not complete his related subjects work. After the trainee completed the assignment, the instructor resorted to positive reinforcement by appointing the apprentice as leader of a group instructional activity. The next week the instructor enlisted the assistance of the job supervisor, whom the apprentice respected, to provide praise for completing related subjects assignments. By this time, the apprentice was beginning to respect the instructor and to accept her praise as reinforcement. Eventually, success in related subjects instruction became rewarding in itself.

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are not learned will never be acquired if information as to their correctness is not provided.

Non-reinforcement also can be used purposefully by the related subjects instructor. In this case inappropriate behavior is not reinforced (ignored), because the instructor wants the behavior to fade. Such a strategy may be useful for disciplinary problems, which are discussed more fully in module #8. But remember you must also couple non-reinforcement with rewards for and information regarding the appropriate behavior.

Example

Allen Newton teaches a course entitled, Working in Organizations, at a community college. The course deals with all aspects of work, including such topics as taking criticism and directions, appropriate dress and grooming, labor unions, supervising employees and so on. Newton frequently has apprentices from a number of different local firms in his class, thus he tries to individualize course content and activities to the extent possible. As part of the individualized planning, Newton plans how to reinforce learning. He utilizes a variety of self-teaching materials and incorporates feedback into learning exercises so that the apprentices can 1) determine whether they have completed assignments successfully, 2) realize where they made errors, and 3) be directed as to how they can improve their performance. He also makes an effort to find out which of the apprentices require more of his help and praise as reward for completing a task. Next, he makes clear how trainees' learning will be evaluated and what rewards they will gain through the completion of the instructional activities. He is careful to point out the value of their mastering instructional content to their success in the working world. As appropriate, he also mentions more intermediate rewards that they may expect to experience in the classroom:

1. Working together on group activities.
2. Perfecting job interviewing techniques.
3. Completing 45 hours of related subjects in-

the-job supervisor and by requiring the apprentice to invest time in producing examples from the workplace that illustrated the major points made in class. Newton found that, over time, the greater the investment of time he could get from apprentices, the greater they valued the related subjects instructional experience.

Other references you may wish to consult include:

J.L. Russell, *Motivation* (Dubuque, Iowa: Wm. Brown Co., Publishers; 1971).

J.P. Houston, *Fundamentals of Learning* (New York: Academic Press; 1976).

Self-Test Exercises

Answer the following questions in the space provided or on separate work paper. Check your answers with those provided in the appendix at the back of the booklet.

1. What are the two ways that reinforcement assists in learning?

   _____   _____

   How do they differ?

   _____

   _____

   _____

   _____

2. Describe what the following principles of reinforcement mean in terms of applying them in instruction.

   a. Immediate reinforcement —

   b. Linking behavior and reinforcer —

   c. Intermittent reinforcement —

   d. Positive reinforcement —

   e. Reinforcement strength —

3. List four reinforcers of apprentice behavior. How have you applied them in related subjects instruction in the past? Can you think of any other applications of the reinforcers?

   a. _____   a. _____

   _____

   _____

   b. _____   b. _____

5. Skill: Order Lessons and Activities So Each Builds on Previous Lessons

Introduction And Objectives

Ordering lessons and activities so that each builds on previous lessons and materials often is called "sequencing." It is one of the more difficult teaching skills to master. It is important in related studies for at least three reasons. First, many skills and complex knowledges build on more elementary information that must be mastered prior to undertaking and learning the more complex skill or information. Sequencing materials is the only certain way of insuring that the necessary, simpler information is addressed first. Second, ordering lessons or sequencing materials is a means of drawing together or organizing all of the proposed content for a related subjects instruction course. It will aid you in preparing your daily lesson plans, will assist you in reporting outcomes to the program sponsor, and will enable apprentices to understand better the entire content expectations for their training period. Third, some of the trainees in your charge will not have done particularly well in formal schooling. Primary reasons for their difficulty with traditional schools usually included lack of understanding about expectations, rules, and responsibilities; lack of association between the content of instruction and their own daily lives; and boredom, disinterest and frustration from either having the same information repeated again and again, or from having failed to master some basic information and never having been able to catch up or even figure out exactly what materials they had missed. Sequencing information and making known to apprentices the prescribed order is an excellent way to help establish favorable differences between related subjects instruction and traditional, formal school.

Sequencing or ordering content is difficult. It requires that you be thoroughly familiar with the skills

2. Suggest those procedures that are most usefu given situations.

As you work your way through these materials, th about how you might sequence effectively the cont of your related subjects instruction.

Why And When To Use The Skill

Remember, sequencing is valuable as an organiz device. It helps insure that all critical points are cove at the appropriate times, and it helps to motivate le ers and eliminate frustration. It also can be useful in dividualizing instruction since it will assist you to ma lessons to learner needs. This is particularly helpfu you consider the newness and complexity of the in mation in order to decide how much time can be sp or needs to be spent on various lessons.

Sequencing content usually occurs at the beginr of the related subjects instructional period. Howe you may need to adjust the content throughout the structional period based upon the progress and the the-job training needs of apprentices.

How To Sequence Or Order Content

There are several different ways to sequence or o materials. No particular model is necessarily superio any other model. Instead, your decisions about wi model to use should be based on the type of conter be sequenced and the abilities of the trainees who use the materials.

Several models for sequencing content are discu on the following pages. You might use any or all of

ent for entire years or terms of apprenticeship of related subjects instruction.

Simple-to-Complex Sequence

The simple to complex sequence involves arranging the content in an order so that mastery and understanding of the necessary and elementary elements of information is achieved before proceeding to the more difficult information and elements. The more simple information is used as a building block to the more difficult knowledge. It also permits trainees to realize that they have achieved success with initial learning and motivates additional learner effort. Most manual skills such as operating a machine or driving a vehicle can be taught well using this sequencing technique. The idea is to break down all complex actions into simple, component parts. First you teach the component parts; next you teach the combining of the parts; finally you teach the entire complex action and the information associated with it. Each piece of information helps build a structure upon which the capping or terminal skill rests; the terminal skill is the ultimate performance objective. Progress is measured by assessing the apprentice's mastery of subordinate skills and information. Figure 6 illustrates the simple-to-complex sequence.

—— —— 1. Consider the component parts of the final performance objective. Are there skills and knowledges that can be mastered independent of the final performance and must they be mastered before the final performance can be enacted?

—— —— 2. Would it be helpful to review content and skills covered previously in your efforts to teach the new content?

—— —— 3. Is mastery of the content under consideration necessary as a foundation for more complex skills and information?

—— —— 4. Are some aspects of the material learned more quickly and easily than others?

—— —— 5. Are various portions of the content fairly simple while others have many aspects and factors to consider?

If "yes" is the answer to at least four of these questions, you may want to use the simple-to-complex sequencing technique.
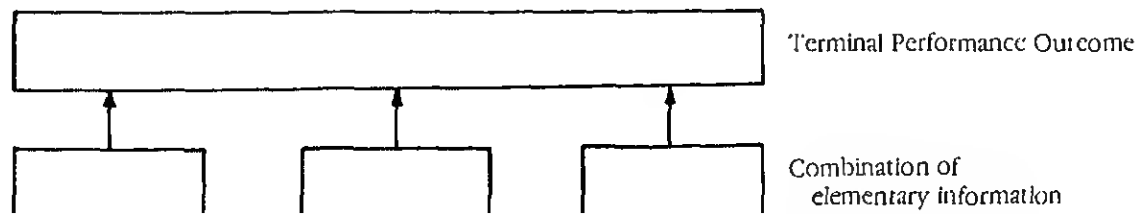

Terminal Performance Outcome

Combination of
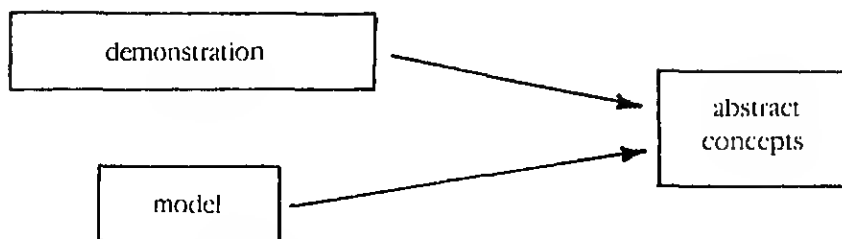elementary information

Figure 8: Concrete-to-Abstract Sequence

Chronological Sequence

Chronological sequence is perhaps the most simple procedure for ordering content. It is especially useful for teaching a particular process or type of operation with relatively uncomplicated machines. You use the procedure when you arrange in a specific pattern the order of occurrence or time periods for a set of operations or activities. It establishes a fixed order to and relationship of the events you present to each other; in addition, it establishes this pattern as the expected and accepted procedure. Figure 7 illustrates the chronological sequence.

Among the criteria you should consider in making a decision about using this procedure to order chronologically are:

Yes   No

____ ____ 1. Does the content require that patterns or consistencies by noted and explained?

____ ____ 2. Is there a prescribed order to the activities, tasks, events, procedures or information that you must teach?

____ ____ 3. Does the information emphasize timing or time periods?

Concrete-To-Abstract Sequence

The concrete-to-abstract sequence is a particularly effective procedure for use with adults who are unfamiliar with the content under consideration. This technique involves presenting manipulative, visual, demonstrable, non-abstract information first and using it as building blocks to teach abstract concepts. The physical manipulation and observation of events is the basis of the more abstract and symbolic information that often will be presented as analogy. The concrete learning information usually can be perceived by more than one means such as touch, sight or auditory understanding. In this way, the information is more easily understood and remembered. Therefore, it frequently can serve as a point of reference from which to begin when processing more complex and abstract information. Such presentations also help overcome language and vocabulary difficulties with new materials. Information such as models, parts, tools, pictures and demonstrations are the most frequently used types of material in concrete presentations. Figure 8 illustrates the concrete-to-abstract sequence.

Among the questions you should ask of the content when trying to decide whether to use this procedure are:

Yes   No

If "Yes" is the answer to these questions, then probably the concrete-to-abstract sequence would be appropriate for you to use.

General-to-Specific Sequence

A fourth way of ordering information is termed a general-to-specific sequence. This technique means that the entire final outcome and use of the information is presented first as an overview to demonstrate the purpose and Intent of instruction. Then more specific and detailed information about components of the total information and skill base can be presented. The overview helps learners to categorize specific information and to determine the relationships of the various specific Information to each other. General-to-specific sequences are especially useful when presenting large amounts of moderately difficult information. Frequently science topics can be presented in this fashion. Figure 9 illustrates the general-to-specific sequence for ordering content.

Among the questions you should ask In order to determine if the general-to-specific sequence is appropriate for you to use are:

Yes   No

‎1. Can you present the overview of the information in a concise and useful manner?

‎of a total picture?

‎3. Can the meaning of the whole skills and information be enriche by emphasizing the similarities an differences among compone parts?

‎4. Can specific information, characte istics, actions and requirements deduced from more general stat ments?

If "Yes" is the answer to these questions, then pe haps the general-to-specific sequence would be usel to you.

Specific-To-General Sequence

The fifth way to sequence information is termed th specific-to-general mode of ordering. Frequently It r quires you to provide more guidance to the learner b cause the overall picture will not become clear for son period of time. However, it does encourage active pa ticipation and thorough understanding. It is similar both the concrete-to-abstract and the simple-to-co plex sequencing procedures In that each step usual Involves use and presentation of progressively mo difficult information. It differs from concrete-to-a stract sequencing because frequently the Informatic presented in the specific-to-general sequence will largely abstract at all levels. It differs from the simple-t complex sequencing because much of the basic info mation will be complex while terminal information m be application or additional combinations or divisio of original information.
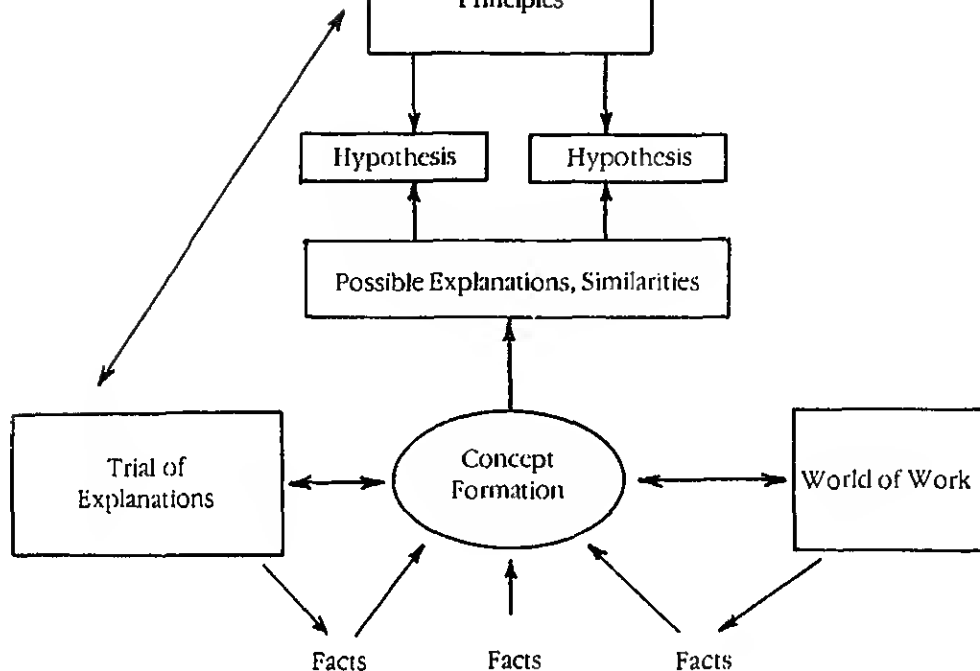

Overview of

Figure 10: Specific-To-General Sequence

The specific-to-general sequence consists of three processes. The first task is organizing information that was previously unorganized. This may require grouping information, categorizing items or groups, and abstracting common characteristics. It is a kind of concept formation drawn from raw data. The second task focuses on interpreting the collected and grouped data. This involves forming generalizations, extrapolating to new events, identifying cause and effect relationships, tracing similar aspects of selected topics and attempting to infer logical implications of events, based upon known facts. The third task is to apply the facts, generalizations and conclusions. This involves generating predictions of consequences, explaining predictions, formulating and testing hypotheses, and using the infor-

eralizations that help organize the information?

_____ _____ 2. Do the generalizations and concepts offer explanation about why and when certain things occur?

_____ _____ 3. Based on the generalizations can you predict other occurrences or activities?

_____ _____ 4. Given the prediction, can you test the validity/usefulness of the prediction?

If you can answer yes to these questions, then perhaps the specific to general sequencing order will be useful to you.

Content	Topics	Sequencing Techniques
Background	Safety	Simple-to-complex
	Tools	Simple-to-complex
	Nomenclature	Simple-to-complex
	Lubrication	Chronological
	Knife changing	Chronological
	Squaring gauges	Chronological
tock	Estimating	Simple-to-complex
	Counting	Simple-to-complex
	Jogging	Simple-to-complex
	Handling	Simple-to-complex
Gauges	Single	General-to-specific
	Double	General-to-specific
	Triple	General-to-specific
	Fourth	General-to-specific

Further, different content needed to be taught in different ways. Walter decided first to lay out all necessary content and then to sequence the content within units in order to help individualize instruction. Figure 11 displays some of Walter's prescribed content, specifically, that relating to paper cutting. Note that the figure includes Walter's decisions about how to sequence broad topics within the content. His ideas are reflected in the order of subjects presented as well as his labeling of the sequencing procedure.

Note that within the three units, Walters used different sequencing techniques. In each case, he matched the characteristics of the content with the attributes of the sequencing technique. Therefore, for example, he decided to use the simple-to-complex model for discussing safety precautions while using the chronological technique for presenting information on squaring gauges.

Self-Test Exercises

Answer the following questions in the space provided or on separate work paper. Check your answers with those provided in the appendix at the back of this booklet.

1. Read each of the following descriptions and name the sequencing technique that best describes the definition.
   a. The events or actions are presented in order of occurrence.
   b. An overview is presented in order to introduce and explain component parts.
   c. Mastery of advanced skills requires mastering more elementary information.

2. Read each of the following scenarios and suggest a type of sequencing that would be appropriate for use.
   a. Barry Doss teaches related subjects in a welding program. Included in his content is material related to arc welding build-up techniques, using a rod, single-pass build-up, and weave build-up. How would you recommend that he sequence the materials?
   b. Wayne Owens teaches related subjects instruction to apprentice machinists. Part of the subject matter he must present is information on algebra including materials on signs, the concept of unknowns, solving for no knowns, and solving complex equations. How would you recommend that he sequence the materials?
   c. Sarah Wilholt teaches related subjects to apprentice drafters. Among the topics she presents is information on the transition in drafting practices from wet blue prints to electrostatic copies and ink to paste letters. How would you recommend that she sequence the materials?